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PEDERAL COMMENCATIONS COMMISSION OFFICE OF THE SECRETARY

WRITER'S TELEPHONE (202) 639-6755

November 12, 1998

Via Courier

Ms. Magalie R. Salas Secretary Federal Communications Commission 1919 M Street, N.W., Room 222 Washington, DC 20554

Re: RM-9395

Notice of Ex Parte Presentation

Dear Ms. Salas:

U.S.A. Digital Radio Partners, L.P. ("USADR"), by its attorneys, hereby notifies the Commission, pursuant to Section 1.1206 of the Commission's rules, of a meeting held on November 9, 1998 with Dale Hatfield, Bruce Franca, Robert Eckert and Robert Bromery of the Office of Engineering and Technology. The purpose of the meeting was to discuss the USADR Petition for Rulemaking ("PFR") on digital audio broadcasting. As discussed in the attached presentation materials, USADR provided an overview of the regulatory and technical issues raised in the PFR. An original and one copy of this notice are being submitted to the Secretary's Office. Copies of this letter are being provided to Mr. Hatfield, Mr. Franca, Mr. Eckert and Mr. Bromery as well.

Any questions regarding this matter should be directed to the undersigned.

Respectfully submitted,

Robert A. Mazer

Counsel for U.S.A. Digital Radio Partners, L.P.

RAM:dks Enclosure

cc:

Dale Hatfield

Bruce Franca Robert Eckert Robert Bromery

HOUSTON

DALLAS

WASHINGTON, D.C.

AUSTIN

MOSCOW

LONDON

SINGAPORE

USA DIGITAL RADIO, PARTNERS, L.P.

Presentation to

Office of Engineering & Technology

November 9, 1998

USADR is a Limited Partnership comprised of CBS Corporation as General Partner and Gannett Co., Inc. as Limited Partner

USADR TECHNICAL TEAM

- Westinghouse Wireless Solutions
- Fraunhofer Institut für Integriente Schatungen
- Xetron
- BittWare
- Shively

REQUESTED FCC ACTIONS

- Determine public interest will be served by introduction of DAB
- Find that IBOC is best means to introduce DAB in the U.S.
- Establish interference protection criteria (Digital/Analog and Digital/Digital)
- Establish Transition Plan

REQUESTED FCC ACTIONS (cont'd)

- Establish a process for adopting a DAB transmission standard
- Establish criteria and process for evaluating IBOC systems
- Select a single IBOC system as U.S. transmission standard

IBOC DAB SYSTEM REQUIREMENTS

- Integrated AM and FM Solutions
- Audio Quality
- Compatibility
- Coverage
- Analog reception

- Auxiliary services
- Flexibility
- Cost
- Graceful degradation
- Channel acquisition

TRANSITION PHASES

- Analog
- Interim Hybrid Phase
- All-Digital Phase

TRANSITION PLAN

- Broadcasters allowed to immediately transmit both analog and digital signal in hybrid mode.
- FM hybrid signals must meet new hybrid FM mask.
- AM hybrid signal must meet new AM mask.

TRANSITION PLAN (cont'd)

- Twelve years after effective date of DAB rules a new FM mask would become effective that would allow the broadcaster to increase the power of its digital FM transmission.
- All-Digital AM signal must comply with AM Hybrid mask.

DAB Transmission Standard

- A standard is necessary to align transmission and receiver equipment
 - Portability
 - Universal reception
 - Broadcasters will not purchase DAB transmission equipment unless there is confidence that receivers will be available
 - Receiver manufacturers unlikely to invest in IBOC

DAB Transmission Standard (cont'd)

- FCC is the proper forum to set standard
 - Private standard setting unlikely to result in consensus
 - Multiple proponents/heterogeneous nature of broadcast and consumer electronics industry

Proposed FCC Process

- Issue Notice of Proposed Rulemaking (July 1, 1999)
 - Standards
 - Interference Protection
 - Transition Plan
 - Performance Evaluation Criteria

Proposed FCC Process (cont'd)

- Proponents submit system and test results (December 15, 1999)
- FCC adopts Report and Order (2Q2000)
 - Select transmission standard
 - Establish interference protection criteria
 - Transition Plan

USADR AM DAB SYSTEM

- Existing AM Broadcast Environment
- System Description
- System Performance

USADR FM DAB SYSTEM

- Existing FM Broadcast Environment
- System Description
- System Performance

UPGRADE TO DAB

- Transmitters
- Receivers



IBOC
Technical Update





AM Overview



Channel Characterizations

- Characterizations Performed on Three Stations
- Wideband Test Signal Characterized Channel Response in Amplitude and Phase
- Signal Variations From Grounded Conductive Structures Recorded in Phase and Amplitude
- Nighttime interference levels recorded
- Results used in System Simulations and Lab Tests



Channel Characterization Results

- AM channel stable for a high percentage of data collection time
- Multipath typical at higher frequencies is rare in the AM band
- Most common fades due to power lines
- Perturbations caused by about 5% of power lines,
 50% of signs, and most overpasses
- Fades more severe at higher frequencies
- Measured channel characteristics used in computer simulation



AM Interference Study

- 101 Stations Selected From FCC Database Based on Market Size, Geographic Location and FCC Allocation Class
- 72 Radials Calculated for Each Station
- The 2 mV/m Day and the 2 mV/m or Night Limit or 25 mV/m Night Contours Mapped
- Interference Charts Generated for Each Station
- Histograms generated showing Day & Night Channel Statistics



AM Interference Study results

- Interference widely varies across stations
- Receiver SNR increased by 2 dB for 85/50% of receiving stations during daytime/nighttime
- Histograms show:
 - That IBOC Systems will have to work with interference within the 2 mV/m contour
 - Daytime Adjacent Channel interference levels are typically greater than 20 dB D/U
 - Nighttime Interference Levels are typically greater than 0 dB D/U





- "FM Like" stereo audio quality
- Selectable audio encoding rates of 48, 32, or 16 (All-digital only) kbps
- Use existing spectral allocations
- Maintain current analog AM broadcast signal quality and coverage





AM IBOC System (Continued)

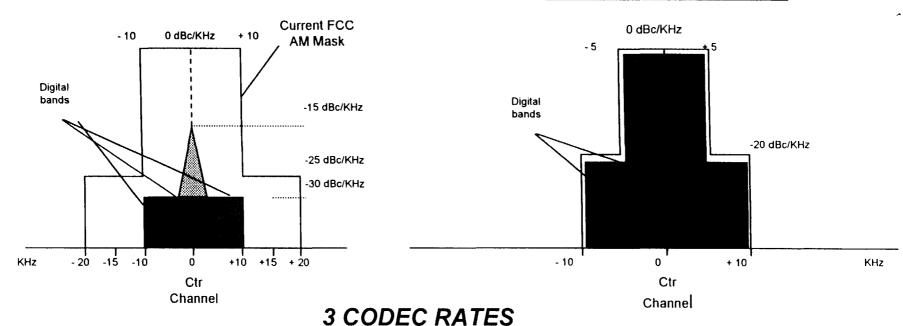
- Auxiliary Services
- AM Receiver Integrated With FM Hybrid and All-Digital Systems
- Migrates to All-Digital IBOC With More Robust Performance in the Presence of Interference and Noise
- Time Diversity Blend Backup to Analog (Hybrid) and Secondary Digital (All-Digital)



AM IBOC Systems and Operating Modes



ALL DIGITAL IBOC AM SYSTEM



Lower rate = more robust distant coverage

48 kbps FM Stereo - Like

32 kbps Digital Stereo Quality

16 kbps Digital Mono Quality



Hybrid Waveform

- 20 kHz bandwidth avoids 2nd adjacent channel interference.
- Multiple carriers and Error Correction Allow reception in the presence of 1st adjacent channel interference.
- Quadrature carriers beneath analog signal minimizes crosstalk to host.
- DAB Signal Power -19 dBc



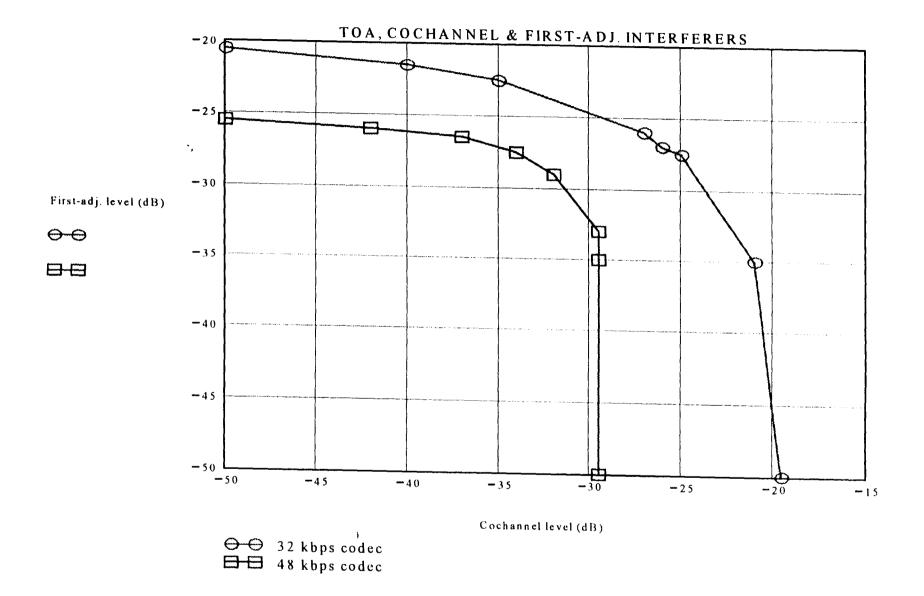
All-Digital Waveform

- 20 kHz Stepped Waveform
 - Avoids 2nd Adjacent Interference
 - Tolerates Simultaneous 0dB D/U 1st Adjacent Interferers.
- Higher Power Digital Carriers in Central Region Increase Robustness.
- Fast Tuning and Back-up Channel Replace Analog Signal.



AM Performance Results





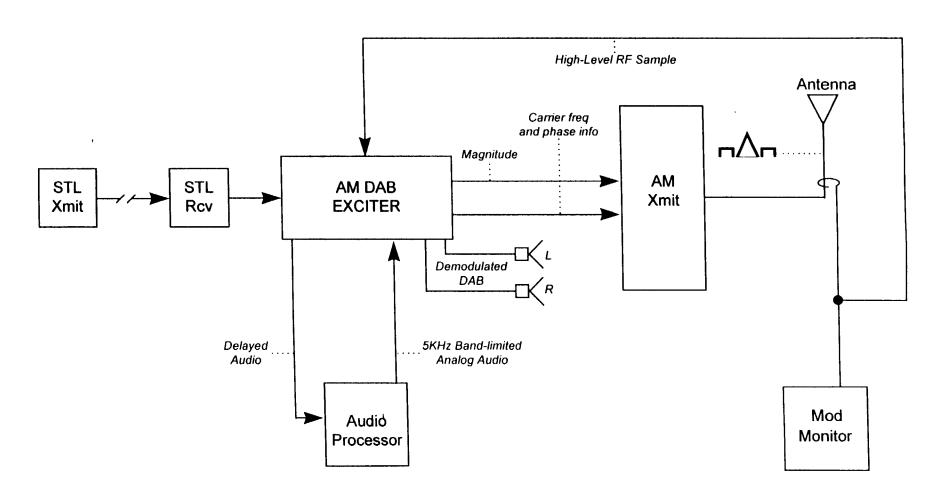


AM Implementation

- Transmitter suitability dependent noise performance
- AM IBOC signal can be transmitted through existing modern transmitters.
- Antenna bandwidth concerns mostly limited to +/-5 kHz region.
- Pattern bandwidth considerations will effect performance in nulls.
- Present STL systems potentially too noisy.



IBOC AM Transmission System







FM Overview

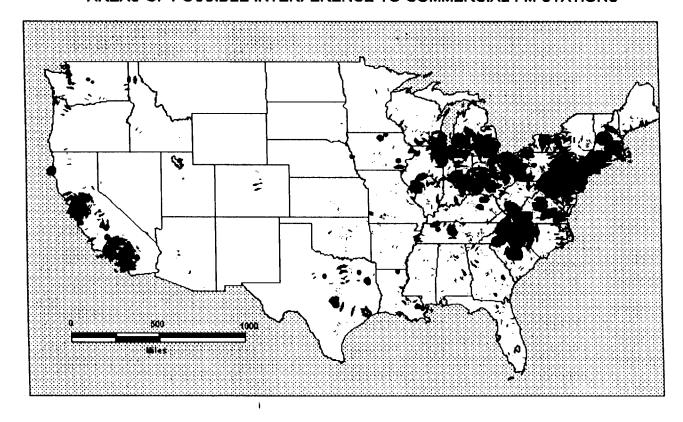


FM Channel Study

- Interference profile of every FM Station in the Continental US Studied
- Co, First, and Second Adjacent Interference Levels Determined
- Studied the Worst 10 Interfered Stations
- Generated Maps and Histograms Depicting the Extent of Interference



AREAS OF POSSIBLE INTERFERENCE TO COMMERCIAL FM STATIONS





Interference Study Conclusions

- 60% of the FM Stations Experience Interference As Defined by the FCC
- The Worst Interfered Stations have Multiple Interferers --- lose substantial coverage Area
- The Introduction of IBOC Will Have Minimal Effect on Existing Analog Reception
- IBOC Improves Performance in the Presence of Adjacent Channel Interference





- Digital coverage will approximate analog coverage
- Virtual-CD quality sound with AAC audio compression technology
- Redundant sides resolve 1st adjacent channel interference
- No interference issues with 2nd adjacent channels





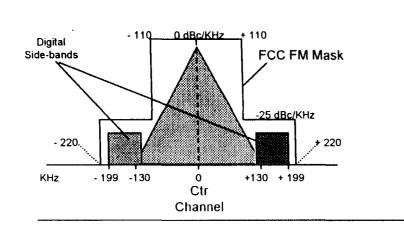
FM IBOC DAB System (Continued)

- Time diversity backup blend to analog (hybrid) and secondary digital (all digital)
- •Multipath resistance through multiple channels (OFDM), advanced coding, and interleaving

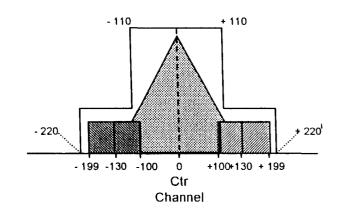


IBOC FM Systems and Operating Modes

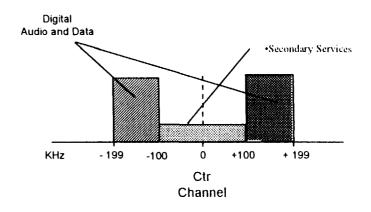
HYBRID IBOC FM SYSTEM



Hybrid with Auxiliary Services



ALL DIGITAL IBOC FM SYSTEM





Hybrid Waveform

- Dual Redundant Sidebands
- Multiple carriers
- Power in DAB signal -22 dBc
- Digital Carriers Placed to Minimize Interference from / to 1st Adjacent Channels
- Third Harmonic of 38 kHz Stereo Subchannel Avoided to Minimize Crosstalk to Host Analog

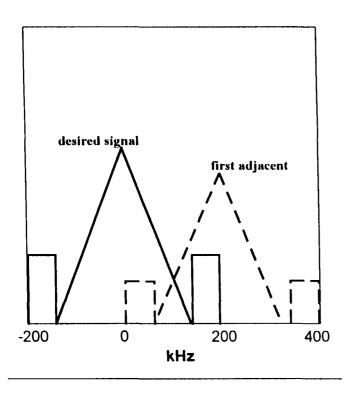


All-Digital Waveform

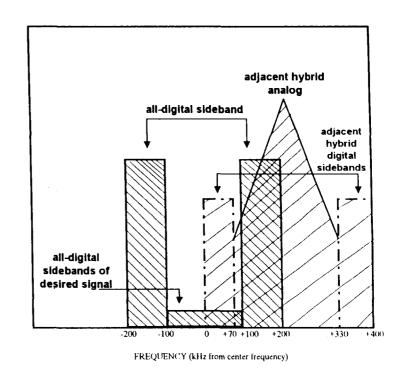
- Digital Information Centered About Assigned Channel
 - Frequency Diversity More Robust Against Multipath
 - Virtually Eliminates Digital Interference to/from Hybrid or other All-Digital signals
- Additional carriers in center of channel for Secondary Auxiliary Services



FM System Compatibilities



First Adjacent Hybrid Stations

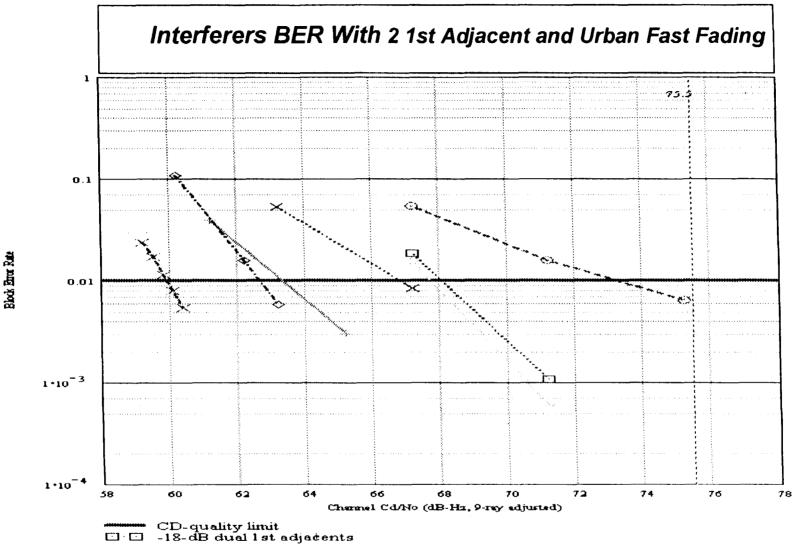


First Adjacent Hybrid and All-Digital stations



FM Performance Results





CD-quality limit

-18-dB dual 1st adjacents

-6-dB dual 1st adjacents

-24-dB dual 1st adjacents

-30-dB dual 1st adjacents

-6-dB, -30-dB dual 1st adjacents

Gaussian 9ray

-6-dB 1st adjacent

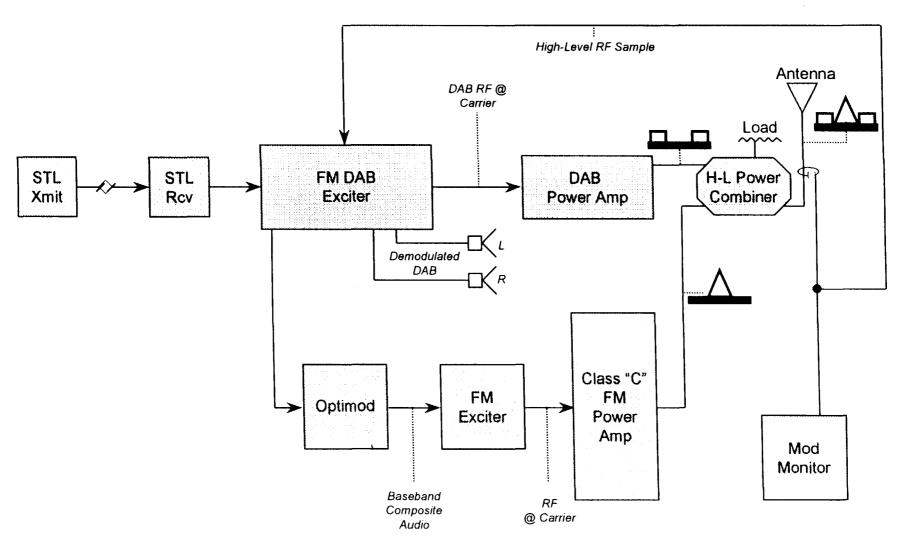


FM Implementation

- System requires linear amplifier with 10 dB peak RMS ratio.
- Currently working with transmitter manufacturers in the design of IBOC transmitters
- •Existing STL systems potentially too noisy



High Level Combined IBOC FM Transmission System





AM & FM System Conclusions

- •The IBOC System meets the goals of providing a High Quality Digital Service in the Existing Interference Environment
 - Implementable on Existing Radio Stations
 - Analog Hybrid All-digital Co-existence
 - •Easily Transitions to an All-digital Mode

